

CLAIMS

1. A method for controlling a system of label-switched tunnels through a communication network, the method comprising:

pushing a signaling label onto a signaling frame at a first node in the network;

sending the signaling frame through the label-switched tunnels to one or more recipient nodes in the network;

popping the signaling label off the signaling frame at the one or more recipient nodes; and

responsive to the signaling label, processing the signaling frame at the one or more recipient nodes so as to eliminate loops formed by the label-switched tunnels.

2. A method according to claim 1, wherein the label-switched tunnels comprise multiprotocol label switching (MPLS) tunnels.

3. A method according to claim 1, wherein pushing the signaling label comprises inserting an agreed-upon value in the signaling label indicating that the signaling frame belongs to a protocol for eliminating the loops formed by the label-switched tunnels in a transparent local area network system (TLS), and wherein popping the signaling label comprises determining that the signaling frame is to be processed in accordance with the protocol responsive to the agreed-upon value in the signaling label.

4. A method according to claim 1, wherein the signaling frame is generated and processed in accordance with a spanning tree protocol (STP).

5. A method according to claim 4, wherein processing the signaling frame comprises setting a transmitting state for each one of the label-switched tunnels.
6. A method according to claim 5, wherein the label-switched tunnels are used in a transparent local area network system (TLS), and wherein for at least one of the label-switched tunnels, the transmitting state is set to a blocking state so as to prevent frames from being sent across the at least one of the label-switched tunnels, in order to eliminate a loop in the TLS.
7. A method according to claim 5, wherein for at least one of the label-switched tunnels, the transmitting state is an active state so as to allow frames to be sent across the at least one of the label-switched tunnels.
8. A method according to claim 1, wherein sending the signaling frame comprises sending the signal frame through the label-switched tunnels that are used for carrying user data.
9. A method according to claim 8, wherein the label-switched tunnels are arranged to provide a virtual bridge service for carrying the user data.
10. A method according to claim 9, wherein the virtual bridge service comprises a transparent local-area network service (TLS).
11. A method according to claim 10, wherein the TLS is one of a plurality of transparent local-area network services (TLSSs) operative in the communication network, and wherein pushing the signaling label comprises pushing information identifying the signaling frame with one of the plurality of TLSSs, and wherein eliminating the loops

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comprises eliminating the loops from the one of the plurality of TLSS that corresponds to the signaling frame.

12. A method according to claim 11, wherein pushing the information identifying the signaling frame comprises pushing a channel label onto the signaling frame along with the signaling label, and

wherein popping the signaling label comprises additionally popping the channel label off the signaling frame, and

wherein processing the signaling frame comprises processing the channel label together with the signaling frame.

13. A method according to claim 11, wherein pushing the information identifying the signaling frame comprises adding the information to the signaling label, and wherein processing the signaling frame comprises processing the information identifying the signaling frame from the signaling label together with the signaling frame.

14. A communication device for operation as one of a plurality of nodes in a communication network, the device comprising:

one or more ports, adapted to send and receive traffic via label-switched tunnels through the communication network; and

a traffic processor which is coupled to the one or more ports, and is adapted to carry out a protocol for eliminating loops formed by the label-switched tunnels by pushing a signaling label onto a signaling frame and sending the signaling frame through at least one of the

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ports via the label-switched tunnels to one or more recipient nodes in the network, causing the recipient nodes to pop the signaling label off the signaling frame and responsive to the signaling label, to process the signaling frame so as to eliminate the loops formed by the label-switched tunnels..

15. A device according to claim 14, wherein the label-switched tunnels comprise multiprotocol label switching (MPLS) tunnels.

16. A device according to claim 14, wherein the traffic processor is adapted to insert an agreed-upon value in the signaling label, and wherein the agreed-upon value is recognized by the recipient nodes so as to determine that the signaling frame is to be processed in accordance with the protocol.

17. A device according to claim 14, wherein the traffic processor is adapted to eliminate loops and generate signaling frames in accordance with a spanning tree protocol.

18. A device according to claim 17, wherein the traffic processor is adapted to set a transmitting state for each one of the label-switched tunnels.

19. A device according to claim 18, wherein the label-switched tunnels are used in a transparent local area network system (TLS), and wherein for at least one of the label-switched tunnels, which was found to be part of one of the loops, the transmitting state is set to a blocking state in which frames are prevented from being sent across the at least one of the label-switched tunnels, in order to eliminate a loop in the TLS.

20. A device according to claim 18, wherein for at least one of the label-switched tunnels, the transmitting state is an active state in which frames are allowed to be sent across the at least one of the label-switched tunnels.

21. A device according to claim 14, wherein the signaling frame is sent through the label-switched tunnels that are used for carrying user data.

22. A device according to claim 21, wherein the label-switched tunnels are arranged to provide a virtual bridge service for carrying the user data.

23. A device according to claim 22, wherein the virtual bridge service comprises a transparent local-area network service (TLS).

24. A device according to claim 23, wherein the TLS is one of a plurality of transparent local-area network services (TLSs) operative in the communication network, and wherein the traffic processor is adapted to identify the signaling frame with one of the plurality of TLSs so as to eliminate loops from the one of the plurality of TLSs that corresponds to the signaling frame.

25. A device according to claim 24, wherein the traffic processor is adapted to push a channel label onto the signaling frame containing the information identifying the signaling frame, and wherein the channel label is popped off the signaling frame by the recipient nodes for use in processing the signaling frame.

26. A device according to claim 24, wherein the traffic processor is adapted to add the information identifying the one of the plurality of TLSs to the signaling label,

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and wherein the information is used by the recipient nodes in processing the signaling frame.